pressure by a small spring. When the pin is full of rivets, the slide is, of course, near the back of the barrel. As rivets are used up, the slide travels down the barrel, one rivet length at a time. It is all rather like the old-fashioned toy, "the monkey up the stick."

Speed of operation is, of course, a matter of experience, but after very short practice, even a young lad can, on a straightforward job where the surfaces to be riveted are in a vertical position, soon attain a speed of some 1,200 rivets per hour. To prevent scoring of the mandrel head of the rivet pin it is necessary to oil this frequently, but apart from this there is little the operator need worry about.

To reload the gun with a new pin, already threaded with rivets, the flat-headed screw at the back of the barrel is unscrewed a few turns. This releases the jaws which hold the tail of the rivet pin. The crank handle is then turned until the lower limb of the fork which controls the front chuck comes out of the housing far enough to slide the flat steel stop into the nick of the fork. This holds the front jaws open, and the pin, with the "free-wheel slide," can be pulled out of the muzzle until the washer of the slide comes up against the shoulder of the jaw housing. The pressure on this washer releases the "ball free-wheel" pressure, the pin can be drawn out, and a new one inserted.

Rivets of various diameters and lengths are available in different materials. Different size rivets need different size chucks for the "muzzle" end of the gun. These are all supplied with the gun.

For wing and fuselage construction, the Chobert rivets are used in the form described. Where watertightness is wanted, such as for riveting the plating of a flying boat hull or seaplane float, this can be obtained by driving small metal pins into the holes in the centre of the tubular rivets. By using a special hammer with a piano wire "springy" handle, the pins are driven right home without bruising the rivet head. Flush-riveting is, of course, possible with the Chobert as with any other process, the rivets being merely made with countersunk heads instead of round heads.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases, accompany letters intended for publication in these columns.

THE BOOKING ANOMALY

From Lord Townshend of Raynham.

THE announcement in your issue last week of the proposed amalgamation between British Continental Airways and British Airways is, as you so rightly point out, likely to be the most important development in air transport since the formation of Imperial Airways.

"*L'union fait la force*" is a tag probably better applied to air transport than to most commercial undertakings, and it can be safely said that, henceforth, a single policy will direct the operation of both inland and Continental services of these companies. The Government has only one instead of two companies to consider for the payment of subsidies, and one group capable of placing large orders with airframe and engine constructors should be advantageous to the British aeronautical industry. If the example set in other countries, notably France and Italy, can be taken as an indication of what may happen as the result of this merger, then it is certain that a more efficient organisation, a greater degree of collaboration with foreign air line companies, an acceleration of services, and a greater attention to the comfort and security of passengers, as well as a reduction in the cost of operation, should result.

But all these benefits are likely to be nullified and lost through lack of co-operation by the railway companies, who seem determined to foster foreign competition to the detriment of British enterprise. Your leading article and Richard Carveth's article do more than just ventilate a grievance of the travelling public.

Civil aviation is still in its infancy, we are told, and it is perhaps unimportant that a relatively small number of people should be inconvenienced by the railway companies. But it must not be forgotten that the embargo placed on the airline companies is also a real hindrance to the design and manufacture of British commercial aircraft in favour of foreign enterprise.

The aircraft operating companies would immediately lay themselves open to criticism if they decided to buy, say, American machines, but when the railway companies are allowed quite freely to divert British money to the pockets of French, German, Belgian, and Dutch undertakings, it is high time the Government stepped in to put a stop to such irregular practice.

TOWNSHEND OF RAYNHAM.

London, N.W.

TAPERED-WING STALLING

I HAVE read with great interest Mr. W. E. Gray's articles on tapered wings and stalling contained in the July 16 and 23 issues of *Flight*. It would appear, however, that sweep-back or sweep forward of the leading-edge must have some influence on the airflow at the trailing-edge, and it would therefore seem that more valuable results might be obtainable if changes of taper could be confined to sweeping of each of the edges in turn for first experiments and extended later to combinations of sweep.

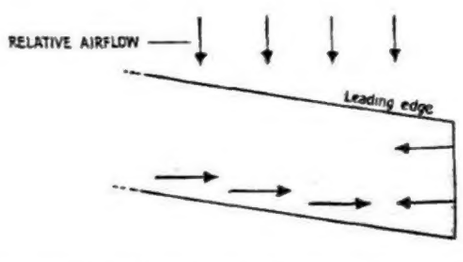
Generally speaking, lateral flow of air on the top surface of a wing must be accompanied by lateral flow over the lower surface in the opposite direction. The effects of lateral lower surface flow are likely to be felt on lift values, but may be of little consequence to stalling. The following remarks are made in the hope that they may be of some assistance in understanding the phenomena connected with tapered wings.

It may be well to consider first the rectangular wing with the pressure differences above and below which give rise to the vortex system, having its core at the wing tip. The vortex flow beyond the tip is upwards, whilst over the wing is the compensating downward flow which is responsible for what is called induced drag, and being most pronounced at the tip results in a smaller effective incidence and consequent late stalling.

Tests have shown, as might be expected, that a moderate amount of taper causes a reduction in the so-called end losses, but if the taper is very pronounced the improvement is lost. The explanation would appear to be as follows: Any pronounced forward or backward sloping of the leading or trailing edge must set up lateral flow due to the lateral pressure gradients, and this lateral flow must cause decreases in the pressure intensities (positive or negative) and hence loss of lift, the effect increasing with the degree of sweep.

The greater lateral pressure gradient due to sweep of the leading edge would at first appear to influence lift to a greater extent than a similar degree of trailing edge sweep, and probably would at normal angles of incidence, but any small loss of negative pressure over the rear part of a wing is of vital importance near the stalling attitude.

From this point we may go on to consider the relation between taper and the position of initial stalling along the span. In general it would seem that where the taper is obtained by sweep-back of the leading edge, or sweep-forward of the trailing edge, the vortex effect would be accentuated and accompanied by late tip stalling, and vice versa. Thus a sweep-back trailing edge would cause an outward flow of air which would be acting contrary to the vortex flow and should result in early tip stalling. There would in fact be a meeting of two opposed air streams (see sketch) causing an upward flow, which in itself would be sufficient to cause an early break-away near the wing-tip.



This also would seem to explain the early stalling of the down-wind tip of a yawed wing, for on the up-wind side the flow round the wing-tip and down on to the top surface decreases the effective incidence there.

R.A.F., Henlow, Beds. C. H. LATIMER-NEEDHAM.